

Claims (amended 14 December 2000)

1. A method for supporting charging of a subscriber of a mobile station (MS) in a cellular radio network supporting circuit-switched and packet-switched connections to/from the mobile station (MS) and comprising at least one mobility support element (MSC/VLR; SGSN, GGSN), at least one radio control element (BSC1, BSC2) and at least one subscriber register (HLR);

the method comprising producing charging information (CDR) related to the mobile station:

characterized by:

defining, for each of several mobile stations (MS), a respective set (LSA1, LSA2) of special cells (C1 - C3, C9 - C10) providing at least one special service to the mobile station (MS);

the subscriber register (HLR) reporting the set of special cells to the mobility support element in an INSERT SUBSCRIBER DATA message, in response to the mobile station initiating an attach or a routing area update procedure;

the mobility support element in turn sending the set of special cells to a radio control element (BSC1, BSC2) in a downlink message; and

determining whether or not the mobile station (MS) is in a special cell.

2. A method according to claim 1, characterised by:

said downlink message being a BSSGP (Base Station Sub-system GPRS Protocol) message, preferably a BSSGP_DL_UNITDATA message or a SoLSA BSSGP message.

3. A method according to claim 1, characterized by:

the charging information comprising detail items, each detail item indicating an event which affects charging;

classifying said detail items into multiple classes depending, at least, on whether or not the corresponding event occurred while the mobile station was in a special cell; and

the mobility support element (MSC/VLR; SGSN, GGSN) performing or at least supporting said classification.

4. A method for supporting charging of a subscriber of a mobile station (MS) in a cellular radio network supporting circuit-switched and

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packet-switched connections to/from the mobile station (MS) and comprising several cells (C1 - C10) and at least one mobility support element (MSC/VLR; SGSN, GGSN) being adapted to receive, when it begins to serve the mobile station, a set (LSA1, LSA2) of special cells (C1 - C3, C9

5 - C10) for the mobile station, and being adapted to send the set of special cells to one radio control element (BSC1, BSC2);

the method comprising the steps of:

defining, for each of several mobile stations (MS), a respective set (LSA1, LSA2) of special cells providing at least one special service to
10 the mobile station (MS);

determining whether or not the mobile station (MS) is in a special cell; and

producing charging information (CDR) related to the mobile station, the charging information comprising detail items, each detail item indicating an event which affects charging;
15 characterized by

classifying said detail items into multiple classes depending, at least, on whether or not the corresponding event occurred while the mobile station was in a special cell; and

20 the mobility support element (MSC/VLR; SGSN, GGSN) performing or at least supporting said classification.

5. A method according to any one of the preceding claims, characterized in that the subscriber register is a home location register (HLR).

25 6. A method according to any one of the preceding claims, characterized by the mobility support element being a support node (SGSN, GGSN) of a packet radio network.

7. A cellular radio network being operable to support circuit-switched and packet-switched connections to/from a mobile station (MS),
30 the network comprising several cells (C1 - C10), and:

for each of several mobile stations (MS), a respective predefined set (LSA1, LSA2) of special cells providing at least one special service to the mobile station (MS);

35 at least one radio control element (BSC1, BSC2) for determining whether or not the mobile station (MS) is in a special cell;

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- at least one mobility support element (MSC/VLR; SGSN, GGSN) being adapted to receive, when it begins to serve the mobile station, the set (LSA1, LSA2) of special cells for the mobile station, and being adapted to send the set of special cells to one radio control element (BSC1, BSC2); and
- 5 at least one charging element (CG, BC) for receiving charging information related to the mobile station, the charging information comprising detail items, each detail item indicating an event which affects charging;
- 10 characterized in that the network is adapted to classify the detail items into multiple classes depending, at least, on whether or not the corresponding event occurred while the mobile station was in a special cell; and
- 15 the mobility support element (MSC/VLR; SGSN, GGSN) is adapted to support or perform said classification.
8. A cellular radio network according to claim 7, characterized in that the mobility support element is a serving GPRS support node (SGSN) which is adapted to compare the cell identity (cell_id) of the MS's current cell with the set (LSA1, LSA2) of special cells for the mobile station.
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9. A cellular radio network according to claim 7 or 8, characterized in that substantially each detail item indicates whether or not the cell in question is a special cell.
10. A cellular radio network according to claim 7 or 8, characterized by being adapted to organise the detail items as consecutive records (CDR), wherein substantially each record indicates whether or not all events indicated by the detail items of the record occurred while the mobile station was in a special cell.
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11. A cellular radio network according to any one of claims 7 to 30, characterized in that the mobility support element (MSC/VLR; SGSN, GGSN) inserts to each detail item the identity (cell_id) of the cell where the mobile station was when the event occurred.
12. A mobility support element (MSC/VLR; SGSN, GGSN) for a cellular radio network comprising several cells, and being operable to

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- support circuit-switched and packet-switched connections to/from a mobile station (MS); the network further comprising for each of several mobile stations (MS), a respective predefined set (LSA1, LSA2) of special cells providing at least one special service to the mobile station (MS); at least one radio control element (BSC1, BSC2) for determining whether or not the mobile station (MS) is in a special cell; and at least one charging element (CG, BC) for receiving charging information related to the mobile station, the charging information comprising detail items, each detail item indicating an event which affects charging;
- wherein the mobility support element (MSC/VLR; SGSN, GGSN) is adapted to receive, when it begins to serve the mobile station, a list of special cells for the mobile station, and it to send said list of special cells to one radio control element (BSC1, BSC2);
- characterized in that the mobility support element is adapted to support or perform classification of said detail items into multiple classes depending on whether or not the corresponding event occurred while the mobile station was in a special cell.
13. A charging-related message (CDR1 - CDR4) for a cellular radio network comprising several cells, each cell having a cell identity (cell_id), and being operable to support circuit-switched and packet-switched connections to/from a mobile station (MS); the network comprising for each of several mobile stations (MS), a respective predefined set (LSA1, LSA2) of special cells (C1 - C3, C9, C10) providing at least one special service to the mobile station (MS); said charging-related message including at least one detail item for substantially each event that affects the charging of the subscriber of the mobile station;
- characterized in that for substantially each detail item, said charging-related message (CDR1 - CDR4) at least indirectly indicates whether or not the mobile station was in a special cell (C1 - C3, C9, C10) when the corresponding event occurred.
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